

Vaccine Update



Michigan Regional Immunization Conferences
October-November 2008

Elements Needed To Assess Causation of Vaccine Adverse Events

	<u>Disease</u>	<u>No disease</u>
<u>Vaccine</u>	a	b
<u>No vaccine</u>	c	d

Risk in "vaccine" group = $\frac{a}{a + b}$

Risk in "no vaccine" group = $\frac{c}{c + d}$

If the rate in "vaccine" group is higher
than the rate in the "no vaccine" group
then vaccines may be the cause

Autism and Vaccines

- Multiple population-based studies have examined the rate of autism among vaccinated and unvaccinated children
- Available evidence does not indicate that autism is more common among children who receive MMR or thimerosal-containing vaccines than among children who do not receive vaccines

Studies of Autism and Vaccines*

Taylor, B, et al. Autism and measles, mumps, and rubella vaccine: no epidemiologic evidence for a causal association. *Lancet* 351:2026-2029, 1999.

Kaye JA, et al. Measles, mumps, and rubella vaccine and incidence of autism recorded by general practitioners: a time-trend analysis. *Brit Med J* 322:460-463, 2001.

Madsen KM, et al. A population-based study of measles, mumps, and rubella vaccination and autism. *N Engl J Med*. 2002;347:1477-1482.

Fombonne E, et al. Pervasive developmental disorders in Montreal, Quebec, Canada: prevalence and links with immunizations. *Pediatrics* 118:e139-50, 2006.

Thompson WW, et al. Early thimerosal exposure and neuro-psychological outcomes at 7 to 10 years. *N Engl J Med* 2007; 357(13):1281-92.

Schechter R, Grether JK. Continuing increases in autism reported to California's developmental services system: mercury in retrograde. *Arch Gen Psychiatry* 2008;65(1):19-24.

*partial listing of representative studies

Sources of Information about Autism

- Centers for Disease Control and Prevention Autism Information Center
 - www.cdc.gov/ncbddd/autism/index.htm
- American Academy of Pediatrics
 - www.aap.org/healthtopics/autism.cfm
- Vaccine Education Center at the Children's Hospital of Philadelphia
 - www.chop.edu/consumer/your_child/index.jsp
- *Autism's False Prophets*, by Dr. Paul Offit (Columbia University Press, 2008)

Rotarix® Rotavirus Vaccine

- Approved by FDA in April 2008
- Contains one strain of live attenuated human rotavirus (G1P[8])
- Two oral doses at 2 and 4 months of age (minimum interval 4 weeks)
- Minimum age 6 weeks
- Maximum age 24 weeks

Provisional Rotavirus Vaccine Recommendations

	Rotarix (RV1)	RotaTeq (RV5)	ACIP Recs
Doses	2	3	--
Min age	6 wks	6 wks	6 wks
Max age-1st dose	20 wks	12 wks	14 wks 6 days*
Max age-any dose	24 wks	32 wks	8 mos 0 days*

*off-label. See www.cdc.gov/vaccines/recs/provisional/

Provisional Rotavirus Vaccine Recommendations

- Provider may not stock or may not know the brand of rotavirus vaccine received for previous dose or doses
- If any dose in the series was RV5 (RotaTeq) or the product is unknown for any dose in the series, a total of three doses of rotavirus vaccine should be given

KINRIX™ Vaccine

- Approved by FDA in June 2008
- Contains DTaP (Infanrix) and IPV
- Approved ONLY for the 5th dose of DTaP and 4th dose of IPV in children 4 through 6 years of age*
- Do NOT use for earlier doses in the DTaP or IPV series

*whose previous doses have been with Infanrix and/or Pediarix for the first 3 doses and Infanrix for the 4th dose

KINRIX™ Vaccine

- Use of KINRIX for any dose other than DTaP5 and IPV4 is off-label, and should be considered a medication error*
- Medication errors should be reported to the Institute for Safe Medication Practices
–www.ismp.org

*dose does not need to be repeated

Pentacel® Vaccine

- Approved by FDA in June 2008
- Contains DTaP, Hib, and IPV
- Approved for doses 1 through 4 among children 6 weeks through 4 years of age
- Do NOT use for in children 5 years or older
- Package contains lyophilized Hib (ActHib) that is reconstituted with a liquid DTaP (Daptacel)/IPV solution

Pentacel® Vaccine

- Do NOT use the Hib (ActHib) and liquid DTaP/IPV solution separately
- Hib must only be reconstituted with DTaP/IPV or specific ActHib diluent (NOT with MMR/varicella diluent or normal saline)
- Guidance for clinicians for the use of Pentacel
– www.cdc.gov/vaccines/pubs/pentacel-guidance.htm

PedvaxHib® Shortage

- PedvaxHib is currently not available
- Improvement in the supply is expected during the 4th quarter of 2008
- During the shortage the booster dose of Hib vaccine (including Pentacel) for healthy children 12 months of age and older should be deferred

www.cdc.gov/vaccines/vac-gen/shortages/

Hib Vaccination Recommendations During the Current Shortage

- What is a “booster dose”?
 - The final dose, following a complete primary series
 - A primary series of Hib vaccine is 2 doses of PedvaxHib/Comvax or 3 doses of ActHib administered before the first birthday
- Children who have not received a full primary series should complete an age-appropriate series as described in the 2008 “catch-up” schedule

New Recommendations for Hepatitis A Postexposure Prophylaxis

- Healthy persons 12 months through 40 years
 - single antigen hepatitis A vaccine at the age-appropriate dose is preferred
- Persons older than 40 years
 - IG is preferred
 - vaccine can be used if IG cannot be obtained
- Children younger than 12 months, immunocompromised persons, persons who have had chronic liver disease diagnosed, and persons for whom vaccine is contraindicated
 - IG should be used

MMWR 2007;56 (No. 41):1080-4

Hepatitis A Vaccine for International Travel

- One dose of single-antigen hepatitis A vaccine administered at any time before departure can provide adequate protection for most healthy persons
- Consider vaccine and IG for older adults, immunocompromised persons, and persons with chronic liver disease or other chronic medical conditions planning to depart* in less than 2 weeks

*to an area of intermediate or high risk of hepatitis A

Preventing Pertussis Infection of Infants

- Assure that you and other staff in your office or facility have received Tdap
- Partner with clinicians who have access to parents and siblings of infants (e.g., OB-GYN providers, prenatal/new parent educators) to provide Tdap to families of infants
- Vaccinate new mothers at the time of discharge if they have not previously received Tdap

MMWR 2006; 55(RR-3):1-43. MMWR 2006;55(RR-17):1-36

Td and Tdap Minimum Intervals

- There is no absolute minimum interval between Td and Tdap
- In “routine” circumstances separate Td and Tdap by 5 years to reduce the chance of a local reaction
- If pertussis immunity is imperative (HCP, infant in household) then administer Tdap regardless of interval since last Td

Human Papillomavirus Vaccine

- Contains noninfectious HPV L1 major capsid protein of 4 HPV types (16 and 18 [oncogenic], 6 and 11 [genital warts])
- Produced using genetic engineering technology similar to hepatitis B vaccine
- Does not contain preservative or antibiotic
- Supplied in single-dose vials and syringes

Human Papillomavirus Vaccine Recommendations

- ACIP recommends routine vaccination of females 11-12 years of age with three doses of quadrivalent HPV vaccine
- The vaccination series can be started as young as 9 years of age at the clinician's discretion

MMWR 2007;56(No. RR-2)

HPV Vaccination Schedule

- Routine schedule is 0, 2, 6 months
- An accelerated schedule using minimum intervals is NOT recommended
- Intramuscular injection in the deltoid
- Minimum age is 9 years
- Maximum age is 26 years (may complete series after age 27 if begun before age 27)

MMWR 2006;56(No. RR-2):1-23

HPV Vaccine Interval Violations

- There is no MAXIMUM interval between HPV vaccine doses
- If the interval between doses is longer than recommended you should just continue the series where it was interrupted

Human Papillomavirus Vaccine

- HPV vaccine is not currently approved for males and women older than 26 years
 - Limited safety and immunogenicity data available for males
 - Off-label use not recommended
- Studies of clinical efficacy in progress now
- Merck has applied to FDA for extension of age through 45 years (females only)

Syncope Following Vaccination

- An increase in the number of reports of syncope has been detected by the Vaccine Adverse Event Reporting System (VAERS)
- 11-18 year old females have contributed most of the increase, many of whom received HPV vaccine
- Serious injuries have resulted
- Providers should strongly consider observing patients for 15 minutes after they are vaccinated

MMWR 2008;57(No. 17):457-60

HPV Vaccine Adverse Reactions

- Mild local reaction most common 84%
 - Redness, soreness, itching at site
- Fever 10%*
- No serious adverse reactions reported

*similar to reports in placebo recipients (9%)

HPV Vaccine VAERS Reports*

- 9,749 reports
 - 94% classified as non-serious (local reactions, syncope, fatigue, etc)
 - 6% classified as serious
- 20 deaths reported
 - no common pattern to the deaths
 - the cause of death was explained by factors other than the vaccine

*As of June 30, 2008
www.cdc.gov/vaccinesafety/vaers/gardasil.htm

HPV Vaccine VAERS Reports*

- Guillain-Barré Syndrome (GBS)
 - no evidence that HPV vaccine has increased the rate above that expected in the population
- Thromboembolic disorders (blood clots)
 - Most had known risk factors (e.g., oral contraceptive use)
 - Additional studies are being conducted

*As of June 30, 2008
www.cdc.gov/vaccinesafety/vaers/gardasil.htm

Impact of Influenza, 1990-1999

- Approximately 36,000 influenza-associated deaths during each influenza season
- Persons 65 years of age and older accounted for more than 90% of deaths
- Average of 226,000 hospitalizations during each influenza season

MMWR 2008;57 (RR-7) and CDC unpublished data

Pediatric Influenza Deaths– 2007-2008

- 85 influenza-related deaths among children 0-17 years of age
 - Median age 6.4 years
 - 23 (27%) younger than 24 months
 - 44 (52%) 5 through 17 years of age
- Only 5 known to have been vaccinated according to 2007-2008 recommendations

MMWR 2008;57(No. 25):692-7 and CDC unpublished data

Influenza Among School-Aged Children

- Influenza outbreaks in schools are very disruptive and amplify the disease in the community
- Students with influenza expose household and other contacts to the infection

MMWR 2008; 57(RR-6)

Influenza Vaccines

- Inactivated subunit (TIV)
 - intramuscular
 - trivalent
 - contains egg protein
- Live attenuated vaccine (LAIV)
 - intranasal
 - trivalent
 - contains egg protein

Inactivated Influenza Vaccines Available in 2008-2009

Vaccine	Package	Dose	Age
Fluzone (sanofi pasteur)	Multidose vial*	Age-dependent	≥6 mos
	Single dose syringe*	0.25 mL	6-35 mos
	Single dose syringe and vial*	0.5 mL	≥36 mos
Fluvirin (Novartis)	Multidose vial	0.5 mL	≥4 yrs
	Single dose syringe	0.5 mL	≥4 yrs
Fluarix (GSK)	Single dose syringe	0.5 mL	≥18 yrs
	Multidose vial	0.5 mL	≥18 yrs
Afluria (CSL)	Single dose syringe	0.5 mL	≥18 yrs
	Multidose vial	0.5 mL	≥18 yrs

*inactivated vaccines approved for children younger than 4 years

Inactivated Influenza Vaccine (TIV)

- All TIV packaged in multidose vials must contain a preservative
- Thimerosal is used as a preservative for TIV
- ACIP has not stated a preference for preservative-free vaccine for any group except persons with an anaphylactic allergy to thimerosal

Trivalent Inactivated Influenza Vaccine (TIV) Schedule

Age Group	Dose	# Doses
6-35 mos	0.25 mL	1 or 2*
3-8 yrs	0.50 mL	1 or 2*
9 years or older	0.50 mL	1

TIV should only be administered by the intramuscular route.
 *Doses should be separated by at least 4 weeks.
 MMWR 2008;57 (RR-7)

Influenza Vaccination of Children

- Children 6 months through 8 years of age who did not receive the recommended second dose of influenza vaccine LAST influenza season (2007-2008) should receive 2 doses during THIS influenza season
- Children 6 months through 8 years of age who are being vaccinated two or more seasons after receiving an influenza vaccine for the first time should receive a single annual dose, regardless of the number of doses administered previously

MMWR 2008;57 (RR-7)

Influenza Vaccination of a 5 Year Old

Prior vaccination	This year
• 1 dose in 2007 (first time)	2 doses
• 1 dose in 2006 (first time), 1 dose in 2007	1 dose
• 1 dose in 2006 (first time), none in 2007	1 dose

The Evolution of Influenza Vaccination Recommendations

- Children 24-59 months were included for routine vaccination in 2007-2008
- Healthy school-aged children are included for routine vaccination in 2008-2009
- In 3-5 years annual influenza vaccination will be recommended for the entire U.S. population

ACIP Recommendations for Influenza Vaccine, 2008*

- All children aged 6 months through 18 years should receive annual influenza vaccination, beginning in 2008 if feasible, and beginning no later than during the 2009-2010 influenza season

MMWR 2008; 57(RR-6)

Influenza Vaccine Recommendations, 2008-2009

- Immunization providers should administer influenza vaccine to any person who wishes to reduce the likelihood of becoming ill with influenza or transmitting influenza to others

MMWR 2008;57 (RR-7)

Inactivated Influenza Vaccine Recommendations, 2008-2009

- Conditions that increase the risk of influenza infection or complications:
 - Age
 - 65 years and older
 - 50 through 64 years
 - 59 months and younger
 - Pulmonary (emphysema, asthma)
 - Cardiovascular
 - Metabolic (diabetes)
 - Renal dysfunction
 - Hemoglobinopathy
 - Immunosuppression, including HIV infection
 - Conditions that compromise respiratory function or increase the risk of aspiration

MMWR 2008;57 (RR-7)

Inactivated Influenza Vaccine Recommendations, 2008-2009

- Persons at increased risk of influenza complications
 - Residents of long term care facilities
 - Persons 6 months to 18 years of age receiving chronic aspirin therapy
 - Pregnant women

MMWR 2008;57 (RR-7)

Pregnancy and Influenza Vaccine

- Risk of hospitalization more than 4 times higher than among nonpregnant women
- Risk of complications comparable to nonpregnant women with high risk medical conditions
- ACIP recommends vaccination with inactivated influenza vaccine for ALL women who will be pregnant during influenza season

MMWR 2008;57 (RR-7)

Influenza Vaccine Recommendations, 2008-2009

- Household members of high-risk persons
- Healthcare personnel, including home care
- Employees of long-term care facilities

MMWR 2008;57 (RR-7)

Influenza Vaccination of HCP

- Annual influenza vaccination is recommended for all persons who work in any medical care facility or provide care in any setting to persons at increased risk of influenza or complications of influenza
- In the 2006 National Health Interview Survey, only 42% of healthcare workers reported receiving influenza vaccine in the previous 12 months

MMWR 2007;56(RR-6):1-54

Reasons HCP Do Not Receive Influenza Vaccine

- Concern about vaccine adverse events
- Perception of a low personal risk of influenza virus infection
- Insufficient time or inconvenience
- Reliance on homeopathic medications
- Avoidance of all medications
- Fear of needles

MMWR 2006;55 (RR-2)

Strategies to Improve HCP Influenza Vaccination Levels

- Education
- Role models
- Reduction of financial and time barriers
- Monitor and report influenza vaccination levels in the facility
- Signed vaccination declination*
- Legislation and regulation

*Examples of vaccination declination forms available in *Infection Control and Hospital Epidemiology*, November 2005, and from the Immunization Action Coalition at www.immunize.org

Live Attenuated Influenza Vaccine

- Approved for healthy persons 2 years through 49 years of age who are not pregnant, such as
 - healthcare personnel
 - persons in close contact with high-risk groups
 - Healthy children
 - persons who want to reduce their risk of influenza

MMWR 2008;57 (RR-7)

LAIV Schedule

<u>Age Group</u>	<u>Number of Doses</u>
2 through 8 years	2
–no previous influenza vaccine	(separated by 4 weeks)
–previous influenza vaccine	1 or 2
9 through 49 years	1

MMWR 2008;57 (RR-7)

Use of LAIV Among Close Contacts of High Risk Persons

- Inactivated influenza vaccine is preferred for close contacts of severely immunosuppressed persons who require care in a protective environment
- Persons who receive LAIV should refrain from contact with severely immunosuppressed persons for 7 days after vaccination
- Persons who receive LAIV do not need to be excluded from visitation of patients who are not severely immunosuppressed

MMWR 2008;57 (RR-7)

Inactivated Influenza Vaccine Contraindications and Precautions

- Severe allergic reaction to a vaccine component (e.g., egg) or following a prior dose of vaccine
- Moderate or severe acute illness
- History of Guillian Barre' syndrome within 6 weeks following a previous dose of TIV (precaution)

MMWR 2008;57 (RR-7)

Live Attenuated Influenza Vaccine Contraindications and Precautions

- Children younger than 2 years of age*
- Persons 50 years of age or older*
- Persons with underlying medical conditions*
- Immunosuppression from any cause*
- Children younger than 18 years receiving long-term aspirin therapy*
- Pregnant women*

*These persons should receive inactivated influenza vaccine

Live Attenuated Influenza Vaccine Contraindications and Precautions

- Severe (anaphylactic) allergy to egg or other vaccine components
- History of Guillian Barre' syndrome within 6 weeks following a previous dose of LAIV
- Children younger than 5 years with recurrent wheezing*
- Moderate or severe acute illness

*These persons should receive inactivated influenza vaccine

Live Attenuated Influenza Vaccination of Children 2-4 Years of Age

- Clinicians and immunization programs should avoid use of LAIV in children with asthma or a recent wheezing episode
- Consult the medical record, when available, to identify children 2 through 4 years of age with asthma or recurrent wheezing that might indicate asthma

MMWR 2008;57 (RR-7)

Live Attenuated Influenza Vaccination of Children 2-4 Years of Age

- Parents or caregivers of children 2-4 years should be asked:
 - “In the past 12 months, has a healthcare provider ever told you that your child had wheezing or asthma?”
- Children whose parents or caregivers answer “yes” to this question, or whose medical record notes asthma or a wheezing episode within the past 12 months, should not receive LAIV
- Inactivated influenza vaccine should be administered to children with asthma or possible reactive airways diseases

MMWR 2008;57 (RR-7)

Administration of LAIV

- Severely immunosuppressed persons should not administer LAIV
- Other persons at increased risk for influenza complications* may administer LAIV
- Gloves and masks are not required

*e.g., pregnant women, persons with asthma and persons 50 years of age or older

Influenza Vaccine 2008-2009

- Providers should begin vaccinating as soon as they receive vaccine, especially
 - children younger than 9 years being vaccinated for the first time (they need 2 doses)
 - healthcare personnel
- ACIP does not recommend a second dose during the same influenza season for any group except children younger than 9 years being vaccinated for the first time

Influenza Vaccine Storage and Handling

- Both TIV and LAIV should be stored at refrigerator temperature (35°- 46° F) at all times
- Neither vaccine should be exposed to freezing temperature

MMWR 2008;57 (RR-7)

Herpes Zoster Vaccine (Zostavax®)

- Administered to persons who had chickenpox to reduce the risk of subsequent development of zoster and postherpetic neuralgia
- Contains live varicella vaccine virus in much larger amount (14x) than standard varicella vaccine (Varivax®)
- Requires freezer storage AT ALL TIMES

Herpes Zoster Vaccine Trial

- 36,716 persons 60-80+ years of age followed for average of 3.12 years after vaccination
- Compared to the placebo group the vaccinated group had
 - 51.3% fewer episodes of HZ
 - Less severe illnesses
 - 66.5% less postherpetic neuralgia
- No significant safety issues identified

NEJM 2005;352(22):2271-84.

ACIP Recommendations for Zoster Vaccine

- Adults 60 years and older should receive a single dose of zoster vaccine
- Routine vaccination of persons younger than 60 years is NOT recommended
- Need for booster dose or doses not known at this time
- A history of herpes zoster should not influence the decision to vaccinate

MMWR 2008;57(RR-5)

Varicella Immunity

- Written documentation of age-appropriate vaccination
- Laboratory evidence of immunity or laboratory confirmation of disease
- **Born in the United States** before 1980
- Healthcare provider diagnosis or verification of varicella disease
- History of herpes zoster based on healthcare provider diagnosis

MMWR 2007;57(RR-4)

Zoster Vaccine

- It is not necessary to inquire about chickenpox or test for varicella immunity before administering zoster vaccine
- Persons 60 years of age and older can be assumed to be immune regardless of their recollection of chickenpox

MMWR 2008;57(RR-5)

Serologic Testing for Varicella Immunity

- If a person 60 years or older is tested for varicella antibody and found to be negative
 - Administer 2 doses of regular varicella vaccine (not zoster vaccine)
 - Zoster vaccine is not indicated for persons whose immunity is based upon varicella vaccination

Zoster Vaccine Contraindications and Precautions

- Severe allergic reaction to a vaccine component or following a prior dose
- Immunosuppression from any cause
- Pregnancy or planned pregnancy within 4 weeks
- Moderate or severe acute illness
- Recent blood product is NOT a precaution

MMWR 2008;57(RR-5)

CDC Vaccines and Immunization Contact Information

- Telephone 800.CDC.INFO
(for patients and parents)
- Email nipinfo@cdc.gov
(for providers)
- Website www.cdc.gov/vaccines/
- Vaccine Safety
www.cdc.gov/od/science/iso/